



# Federal Aviation Administration

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## Memorandum

Date: February 2, 2015

To: Manager, New York ACO, ANE-170

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Fabio Buttitta, ANE-171

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Oxygen Quantity Indication on Model BD-500-1A10 / -1A11, FAA Project #TC4948NY-T

ELOS Memo#: TC4948NY-T-ES-20

Regulatory Ref: 14 CFR § 25.1441(c)

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This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Bombardier Aerospace (BA) Model BD-500-1A10 and BD-500-1A11 airplanes.

### Background

In the proposed Model BD-500-1A10 and BD-500-1A11 type design, Bombardier Inc. (BA) will use small one-time use gaseous oxygen pressurized cylinders installed in the lavatories. No means will be incorporated to inform the crew of the quantity of oxygen available in each of the small pressurized cylinder, and therefore the system will not meet the Title 14, Code of Federal Regulations (14 CFR) 25.1441(c) requirement to provide a means to allow the crew to readily determine during flight, the quantity of oxygen available in each oxygen supply source. Similarly, BA will use one use chemical oxygen generators in the passenger cabin to provide supplemental oxygen to passengers and cabin crew. These will also not incorporate a means to inform the crew of the quantity of oxygen available in each unit. As a result, BA has requested an Equivalent Level of Safety Finding (ELOS) against § 25.1441(c) to allow the use of small one-time use gaseous oxygen pressurized cylinders installed in the lavatories and one-time use chemical oxygen generators in the passenger cabin.

## **Applicable regulation(s)**

§ 25.1441(c)

## **Regulation(s) requiring an ELOS finding**

§ 25.1441(c)

## **Description of compensating design features or alternative standards which allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)**

Bombardier Inc. requests an equivalent level of safety finding against § 25.1441(c) for Lavatory and Passenger Oxygen Supply Units for the Model BD-500-1A10 and BD-500-1A11 aircrafts, based on the following justification and compensating design features:

### Lavatory Oxygen Supply Units (Gaseous Oxygen Cylinders):

- 1) The pressurized cylinder is designed and tested to ensure that it will retain its required quantity of oxygen throughout its expected life under foreseeable operating conditions.
- 2) A means is provided for Maintenance to readily determine whether a pressurized cylinder has been discharged.
- 3) The life limit of the pressurized cylinder is established by test and analysis.
- 4) Each pressurized cylinder is labeled such that the expiration date can be easily determined by Maintenance.
- 5) BA will define maintenance and inspection procedures in the maintenance planning documentation/maintenance manual for TCCA acceptance to ensure that (i) discharged pressurized cylinders are removed from the airplane and replaced under normal maintenance procedures, and (ii) pressurized cylinders are not installed on the airplane past their expiration date.
- 6) Each pressurized cylinder does not supply oxygen to more than two masks.

### Passenger Cabin Oxygen Supply Units (Chemical Oxygen Generators):

- 1) A means is provided for Maintenance to readily determine whether the generator has been expended.
- 2) Each generator is labeled such that the expiration date can be easily determined by Maintenance.
- 3) BA will define maintenance and inspection procedures in the maintenance planning documentation/maintenance manual for TCCA acceptance to ensure that (i) expended generators are removed from the airplane and replaced under normal maintenance procedures, and (ii) generators are not installed on the airplane past their expiration date.

- 4) Each generator does not supply oxygen to more than 3 masks.
- 5) Only chemical oxygen generators without quantity indicators have been used throughout the airline industry for a large number of years. To this date, this practice has not caused any operational or safety issue.

**Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation**

The one-time use lavatory oxygen supply cylinder is designed and tested to ensure that it will retain the required quantity of oxygen throughout its service life under foreseeable operating conditions. As such, the crew is ensured that a sufficient oxygen supply remains inside the cylinder over the entire life limit, or until the flow of oxygen has been initiated. If a cylinder has been depleted due to activation or over pressurization, positive indication is provided so the cylinder assembly can be replaced with a full unit.

The one-time use passenger chemical oxygen generators may be checked by examining the canister expended indicator located at the end of the generator, under the activation pin. If the generator has relieved its contents due to its activation, the expended indicator will turn dark gray/black. When expended indication is present the cylinder must be replaced.

**FAA approval and documentation of the ELOS finding**

The FAA has approved the aforementioned ELOS finding in project Issue Paper ES-20. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TAD has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS memorandum number should be listed in the type certificate data sheet under the certification basis section.

Equivalent Level of Safety Findings have been made for the following regulation: § 25.1441(c), Oxygen Equipment and Supply (documented in TAD ELOS Memo TC4948NY-T-ES-20).

Original signed by Victor Wicklund

2/2/2015

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Transport Airplane Directorate,  
Aircraft Certification Service

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Date

ELOS Originated by NYACO:	Name Gaetano Sciortino	Routing Symbol ANE-170
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